SIGMA XI QUARTERLY

Vol. XIX DECEMBER, 1931 No. 4

ANNUAL CONVENTION
NEW ORLEANS, DECEMBER 29.

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Term expires January, 1934

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Term expires January, 1932

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Changes of address of chapter members and associates should be communicated to chapter secretaries and to the national secretary.

Subscriptions and manuscripts should be sent to the general secretary, Edward Ellery, Union College, Schenectady, N. Y.

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SIGMA XI QUARTERLY

VOL. XIX DECEMBER, 1931 No. 4

ANNOUNCEMENTS

The thirty-second convention of our society is scheduled for New Orleans, Tuesday, December 29, with the following program of events:

4:00 P.M.

Business Session
Roosevelt Hotel, Room C

Business to be transacted includes:

1. Action on formal petitions for charters for chapters at
   (a) Western Reserve University
   (b) Princeton University.
2. Report of Committee on Conservation of Research Talent—President G. W. Stewart, Chairman.
3. Amendment to the Constitution proposed by Cornell Chapter at the thirty-first convention. (See paragraph on page 121.)
4. Report of the Executive Committee on a Proposed Petition to Congress for Federal Grants for Research. (See paragraph on page 122.)
5. Report of Alumni Committee on Research Fund—Dean Hugh P. Baker, Chairman.
6. Report of Committee on Award of Research Grants—Dr. W. R. Whitney, Chairman. (See Quarterly for September, page 113.)
7. Reports of Officers—President, Secretary, Treasurer.
8. Election of Officers—President, Secretary, Treasurer, Member of Executive Committee, Member of Alumni Committee. (See paragraph on page 123.)

6:00 P.M.

Buffet Supper
Roosevelt Hotel
(See paragraph, page 123)

8:30 P.M.

Tenth Annual Sigma Xi Address, Municipal Auditorium
Lecturer; Mr. Clarence F. Hirshfeld, Chief of Research, Detroit **Edison Company**
Topic: "Whose Fault?"

NOTES ON THE CONVENTION PROGRAM

Amendment to the Constitution

At the thirty-first convention, held in Cleveland, December 30, 1930, the Cornell Chapter proposed the following amendment:

Be it resolved, that Article III, Section 3, be amended to read as follows:

> Section 3. Eligibility: Members. The following, and no others, are eligible to election as members in a chapter at any institution: (*a*) any person of professorial or equivalent rank in the institution who has shown noteworthy achievement as an original investigator in some branch of pure or applied science; (*b*) any staff member of lesser rank, or any student in the institution who, as judged by his actual work of investigation, has exhibited an aptitude for scientific research.

Article III, Section 3, of the present Constitution reads as follows:

> Section 3. Eligibility: Members. The following, and no others, are eligible to election as members in a chapter at any institution: (*a*) any professor, instructor, or other member of the staff of the institution who has shown noteworthy achievement as an original investigator in some branch of pure or applied science; (*b*) any student in the institution who, as judged by his actual work of investigation, has exhibited an aptitude for scientific research.

After considerable discussion, it was

Voted—(*a*) That in the judgment of the Convention, the eligibility of an instructor to membership in the Society should be decided on the requirements named in (*b*) of Section 3, Article III, of the Constitution, as follows: "who, as judged by his actual work of investigation, has exhibited an aptitude for scientific research." (*b*) That the proposed amendment be referred to the Executive Committee and the Cornell Chapter for re-wording. (*c*) That the re-phrased amendment be presented to the 1931 Convention.

Since the convention, the Cornell Chapter proposed a resolution of interpretation of Article III, Section 3, to take the place of their proposal for an amendment. The resolution of interpretation is as follows:

RESOLVED THAT:

The phrase "any professor, instructor, or other member of the staff of the institution" in Article III, Section 3 (a) of the Constitution shall be construed as referring to persons who are substantially more mature than students, either graduate or undergraduate, and whose status in the institution is, or is equivalent to, that corresponding to such permanent or semi-permanent appointments as professor, assistant professor, or, in some institutions, instructor.

RESOLVED, FURTHER, THAT

The phrase "any student in the institution" in Article III, Section 3 (b) of the Constitution, shall be construed as referring to persons who, irrespective of holding temporary appointments as instructor, teaching assistant, research assistant and the like, are, or as judged by their attainments are substantially equivalent to, bona fide students in the institution.

At the Spring Meeting of the Executive Committee held in Boston, March 27 and 28, 1931, the amendment and the proposed interpretation were fully discussed, and it was

Voted—That the members of the staff of an institution who are essentially or technically students should be elected under the eligibility requirements of Article III, Section 3 (b) of the Constitution.

The Secretary was instructed to confer with the Cornell Chapter and, if the chapter assented, this interpretation of the article in question should be reported to the 32nd convention of the Society.

The Cornell delegate to the convention wrote the National Secretary that in his personal opinion the phraseology of the action of the Executive Committee was "sufficiently near to the proposed resolution to make it desirable to substitute the committee's vote for" the chapter's.

Unless further communication is received from the Cornell Chapter to change the above, this will be the report of the Executive Committee to the convention.

PROPOSED PETITION TO CONGRESS FOR FEDERAL GRANTS FOR RESEARCH

At the thirty-first convention, Professor Greene (Missouri) presented the following resolution:

To the Congress of the United States:

Whereas we are convinced that research in the fundamental sciences is a necessity for the maintenance and advancement of modern civilization;

Whereas, the Congress of the United States has recognized the principle of financial encouragement of teaching, research and the distribution of useful knowledge by several acts of appropriation.

We, the Society of Sigma Xi, respectfully submit to your consideration the importance of stimulating by financial aid to the states and territories, research in the fundamental and basic sciences, on the advances of which the welfare of the United States rests.

After discussion it was

Voted—That the resolution be referred to the Executive Committee for report at the 1931 Convention.

At its Spring Meeting, the Executive Committee considered this matter in all its aspects, and voted to refer the entire question of federal grants for research to a special sub-committee for study and report to a later meeting. President Stewart appointed Professor True and Dr. Vernon Kellogg as such sub-committee.

Nominating Committee

President Stewart appointed the following as a committee to nominate officers at the thirty-second convention: Professor C. E. McClung, University of Pennsylvania, Chairman; Professor John A. Miller, Swarthmore and Professor L. D. Havenhill, University of Kansas.

Officers to be chosen are President, Secretary and Treasurer, for the ensuing two years; a member of the Executive Committee for the ensuing five years to succeed Professor Baitsell whose term of office expires in January; a member of the Alumni Committee for the ensuing five years to succeed Dean Baker whose term of office expires in January.

Chapters are requested to make recommendations to the committee. They may be made direct to the members or through the office of the National Secretary.

THE BUFFET SUPPER

The supper takes the place of the annual dinner, and will be held at the close of the business session in the Hotel Roosevelt, where the afternoon meeting is scheduled. The supper is intended

primarily for delegates, but all Sigma Xi members and associates will be welcome. The arrangement is made in pursuance of the action taken by the Executive Committee at its Spring meeting. That action is as follows:

Resolved: That the supper be scheduled promptly at 6:00; be informal; not be a joint affair with any organization; that delegates to the convention be urged to be present; and at least one hour be given to an exchange of ideas about Society affairs and the conduct of Society business on the part of the delegates—informal presentations to be arranged in advance.

Chapters and individuals have presented the following as possible topics for discussion. It is hoped that other suggestions will be made to the National Secretary either before the convention or at the time of the meeting.

1. Shall the society adopt a uniform nomination blank for use of the chapters in presenting qualifications of candidates for election as members or associates, such blanks to be issued from the office of the National Secretary?
2. How can a chapter further the spirit of research in the institution and the section where it is located? What should be the nature of chapter activities?
3. What are the national and international possibilities of Sigma Xi?
4. How can Sigma Xi be helpful in institutions having neither chapter nor club?
5. What sort of program should be formulated for the semicentennial of Sigma Xi in 1936?
6. Should Sigma Xi hold its annual conventions independent of all other science conventions?

A CORRECTION

In the Quarterly for September, page 113, announcement was made of an award of a research grant to Professor Claude R. Kellogg, Professor of Biology, Fukien Christian University, Foochow, China. The announcement was accompanied by the statement that Professor Kellogg would do his work at Johns Hopkins University.

This statement was an error. Professor Kellogg is carrying on his work with the Chinese honey bee at the University of Maryland under the joint supervision of Mr. James I. Hambleton, in charge of Agriculture, U. S. Department of Agriculture, and Dr. Ernest N. Cary, State Entomologist.

REPORTS OF RESEARCH WORK ON SIGMA XI GRANTS, 1930–31

Professor Arthur A. Bless, University of Florida; Dielectric Absorption in Relation to the Theory of Debye.

A

Anomalous Dispersion in Liquid Dielectrics

The temperature variation of the dielectric constant of viscous dielectrics was studied for a number of frequencies. Experiments show that the dielectric constant increases with decrease in temperature, reaches a maximum, and then begins to decrease. On the Debye theory this may be explained by assuming that the diminution in temperature affects the dielectric constant in two ways due to the effect on the orientation of the molecules. The lower the temperature the lower is the thermal agitation, thus enabling more molecules to follow the field and increase the value of the dielectric constant. On the other hand the increase in the viscosity and the consequent increase in the internal friction of the molecules opposes the orientation and decreases the value of the dielectric constant. The first effect predominates for higher temperatures, while the reverse holds true for the lower temperature. The maximum is reached when the two effects balance. The correctness of this view is indicated by the fact that the lower the frequency of oscillations the lower is the temperature at which the maximum value of the dielectric constant takes place. The product of the frequency and the viscosity of the substance at the critical point proves to be sensibly constant.

Anomalous dispersion for radio frequencies has been observed first by Drude, and later by Debye. Debye[1] noticed that when the substance is not far from the freezing point, *i. e.*, when the viscosity is very great the dielectric constant decreases with increase in frequency if the range is properly chosen. Some time ago experiments were made here on the variation of the dielectric constant of tung oil with temperature, which showed an exactly similar effect. The dielectric constant increases with decrease in temperature, reaches a maximum and then begins to decrease again. The experiments were performed with apparatus described elsewhere[2] using a heterodyne beat method with a crystal oscillator at a frequency at 1.4×10 cycles.

[1] P. Debye, *Ber.*, **15**, 777 (1923).
[2] A. A. Bless, *Phys. Rev.*, **37**, 1149 (1931).

The maximum of the dielectric constant occurred at 23 degrees C for this frequency.

Experiments were made on the variation of the dielectric constant with temperature for a number of frequencies using the heterodyne beat method with a Hartley oscillator in place of the crystal. The frequencies were measured with a standard General Radio Precision Wave Meter.

The data are given below.

Frequency	Dielectric Constant	Temperature
1.47×10^6	3.01	42
	3.05	36.5
	3.08	31.0
	3.11	23.0
	3.075	14.0
	3.05	9.4
	3.50	9
6.66×10^5	3.01	23
	3.04	18
	3.07	9
	3.02	0
	2.99	− 4
5.36×10^5	2.93	12
	2.95	8
	2.96	2
	2.93	− 2
	2.91	− 5
	2.88	−10
3.95×10^5	2.83	6
	2.85	2
	2.885	− 4
	2.85	− 9
	2.83	−11

It is to be observed that in each case the maximum of the dielectric constant occurs at a lower temperature for a lower frequency. This is to be expected. The molecules follow the field as long as the viscosity is low for the given frequency of oscillation. As the temperature decreases the energy of thermal agitation becomes less and the molecules have even greater freedom to get oriented with a given field, so that the contribution due to molecular orientation increases

with a resulting increase in the value of the dielectric constant. However, when the viscosity becomes so great due to the low temperature, that the internal friction prevents the molecules from following the field, the contribution to the dielectric constant due to molecular orientation begins to decrease. The maximum value of the dielectric constant occurs at a temperature at which this decrease just balances the increase in the value of the dielectric constant due to decreased temperature agitation. As the viscosity rises very rapidly with decrease in temperature the value of the dielectric constant begins to decrease owing to the greatly diminished contribution of the oriented molecules. When the frequency of oscillations is lower the dielectric constant maximum must occur at a lower temperature, for the molecules have a longer time to get oriented, so that a greater viscosity is needed to prevent orientation.

From the above discussion it follows that the product of the viscosity and the frequency of oscillation at which a maximum takes place should remain sensibly constant. To test the hypothesis, the viscosity of tung oil was measured with a Macmichael viscosimeter for a wide range of temperatures. The product of the dielectric constant and viscosity is fairly constant within the rather wide limits of experimental error. This error is due chiefly to the difficulty in measuring the viscosity very accurately. Moreover, such a constancy presumes that the value of the viscosity so measured is proportional to the inner friction of the molecules, an assumption which may not be altogether correct. Experiments are now in progress to determine whether the measured viscosity is proportional to the inner friction.

B

Molecular Rotation in Solids

The temperature variation of the dielectric constant of a viscous dielectric like tung oil was found to present no discontinuities when the substance passes from the liquid into the solid state. The diminution in the value of the constant is gradual, remaining greater than the value of the square of the refractive index for the whole range of temperatures investigated. This indicates the presence of a contribution to the value of the dielectric constant due to molecular orientation, and hence shows that there is some freedom of molecular rotation even in the solid state.

Experiments are now in progress to determine the X-ray diffraction pattern of the substance when the molecules are subjected to direct and slowly alternating fields.

The variation of the dielectric constant with temperature at a frequency of 5×10^5 cycles was measured for a fairly large range of temperatures. The experimental arrangements are described in a previous paper by the author.[1] The data are given below.

Dielectric Constant	Temperature
2.93	12
2.95	8
2.96	2
2.93	− 2
2.91	− 5
2.88	−10
2.86	−13
2.74	−22
2.66	−35
2.57	−45
2.54	−50
2.48	−57
2.40	−65
2.30	−74

Besides showing anomalous dispersion discussed in the preceding paper the graph reveals another very important point. Tung oil freezes at about 250 degrees absolute. The dielectric constant-temperature curve does not present any discontinuities when the tung oil is passing from the liquid state into the solid. The contribution to the dielectric constant of the oriented molecules is diminishing with decrease in temperature, but in a continuous manner. The dielectric constant of the solid tung oil continues to diminish with decrease in temperature in about the same way as when in the liquid state. The inference must therefore be drawn that even in a solid the molecules have a certain freedom of motion, and that the solid and liquid states do not present a discontinuity so far as the molecular rotation is concerned. The notion of molecular rotation in a solid has at first been advanced by Errera in order to explain the existence of anomalous dispersion in the solid state. While it seems rather

[1] *Phys. Rev.*, **37**, 1149 (1931).

difficult to conceive of molecules having such a freedom when in a solid state, this explanation is the most plausible that could be advanced to account for the above facts. A possible way of testing this theory would be to get diffraction patterns of polar compounds when under steady fields and when under the influence of slowly varying fields. The regularity which might exist in the first case should completely disappear in the second. Such a method would also furnish the upper limit of the relaxation time of the molecules, as for some very high frequencies, the molecule would retain its orientation if the field alternations are too great for it to follow. To test these conclusions X-rays from a molybdenum water cooled tube driven at about 30,000 volts and 25 milliamperes were allowed to fall on tung oil contained in a thin flat glass cell. The diffracted rays were received by a photographic film placed at a small distance from the cell.

The direct field was supplied by a D. C. generator capable of furnishing about 1.500 volts. The field on the tung oil molecules was about 5000 volts/cm.

A diffraction halo was obtained from tung oil even when no field was impressed on the molecules. The density of the halo was increased in certain direction when a field was impressed on the tung oil. As the difference in the density is very small it appears advisable to use the ionization method for measuring the effect of an applied field on the polar molecules. The set up is now being modified accordingly.

Professor Jean Broadhurst, Teachers College, Columbia University; Life-Cycle Phases of an Exceedingly Variable Organism (Asco bacillus).

The program of the project involved the securing of a satisfactory film showing the sexual conjugation of this rare organism. The author reports that the main mechanical problems connected with motion pictures of such minute bacteria have been solved. Great difficulty has been experienced in getting the organism back into active sexual conditions. After four months of active manifestations, while the author was struggling with the mechanical difficulties, the organism began slowly to change from the sexual phase. The ordinary vegetative forms which are very minute obscure the background unless the sexual forms are proportionately abundant. Work is now in progress to regain the sexual phase.

Miss Joyce Hedrick, University of Michigan; Work on Manual of Lichens.

A part of the grant has been used for typing and proofreading (descriptions of species, genera and families, keyes to families, genera and species and subspecies), and part has been used to meet living expenses during the summer while at work on keyes and manuscript. Some of the work was done at the Field Museum Herbarium, where material was studied and prints secured. Material from the United States Herbarium has likewise been studied during the year.

Professor Norman Ethan Allen Hinds, University of California; A Study of Hawaiian Lavas.

Several years ago the author made a detailed geological study of the islands of Kauai and Niihau in the Hawaiian Archipelago, and has since published several papers describing their physiography and general geologic features. Brief statements regarding the characters of the igneous rocks were included, but a complete report on this topic could not be made owing to lack of chemical analyses of the principal rock types. The Sigma Xi grant has covered the cost of this analytical work. When completed, fourteen new analyses of rocks from Kauai and one from Niihau will be available in addition to the few already reported. A report on the igneous geology and petrography of the two islands is being prepared. Except for minor details, the microscopic studies are completed and much of the final manuscript is written. Five hundred hand specimens were collected from a number of sections on each island extending from sea level to its summit, and more than three hundred thin sections of these rocks have been examined under the microscope. It is therefore reasonably certain that few petrographic types have been missed.

Kauai and Niihau compose one of the great compound volcanoes of the Hawaiian chain. While their lavas show the same general similarities that apply throughout the group, certain notable differences are apparent. Most of the analyses from Kauai so far submitted show remarkably high percentages of TiO_2 and this is reflected in the abundance of titaniferous augite and ilmenite, not only in the ultra-femic rocks but also in the olivine basalts which are the predominant lavas of the volcanoes. In three analyses TiO_2 exceeds six percent. The Niihau analyses record lower percentages of this oxide and mineralogic studies have proved that titaniferous augite and ilmenite are less abundant than on Kauai. Picritic

basalts and picrites are fairly common on Kauai and a considerable number of nepheline- and melilite-bearing rocks are present. On Niihau these highly differentiated types apparently are rare. The Niihau lavas are chiefly olivine basalts but the proportion of olivine averages less than in those from Kauai. In a number of places on Kauai coarsely granular rocks including dunite, wehrlite, iherzolite, troctolite, gabbro, and alkaline gabbro were found, and chemical analyses of the most common types will be presented. No rocks of this type were collected from Niihau.

Field and microscopic studies did not reveal any salic rocks comparable to the trachytes and oligoclasites which have been reported from other volcanoes in the group and none of the chemical analyses show a high percentage of silica. The most salic rocks are pyroxene andesite which though ranking next to olivine basalt in bulk is present in relatively small amounts. The analyses also indicate that no progressive change took place in the character of the magma during the eruption of the many flows which appear above sea level in the two volcanoes. The various petrographic and chemical types appear at various horizons in both mountains.

The presence of the many highly differentiated rock types affords interesting speculations regarding the differentiation of the basaltic magma whose eruption has been responsible for the building of the Hawaiian Range.

Dr. Icie G. Macy, Merrill-Palmer School and Children's Hospital of Michigan, Detroit; The Calcium and Phosphorus Metabolism of Women in Late Lactation.

Three American women who have been for several years the subject of investigations on the metabolism of women during the reproductive cycle were observed. Milk secretions were maintained over a period of 14 months. The metabolic observations were conducted in the homes of the subjects. Procedures and methods are described in *The Journal of Biological Chemistry*, Vol. XCI, Nos. 1, 3 and 6.

Calcium balance determinations for the three women during the later part of a lactation period in which there had been long continued, intense milk flow, indicate a loss of calcium, in contrast to a storage of the element at corresponding periods in the preceding lactation period of each woman, in which there was a long, progressive decline in the output of milk. There was a storage of phosphorus in all cases at the close of 14 months of lactation. Dur-

ing the postlactation periods, at the 3rd and 12th months after cessation of milk flow, calcium losses and phosphorus storage were indicated.

Addendum—Since this report was written the work of Toverud and Toverud (13) has been made available. Their work indicates that lactating women may store or lose calcium and phosphorus up to $5^1/_2$ months of lactation.

Professor Arthur H. Smith, Yale University; Changes in the Chemistry and Morphology of the Blood Associated with Diets Poor in Inorganic Salts.

Shortly after the award of the Sigma Xi grant, circumstances necessitated temporarily abandoning the study of the blood, for which purpose the grant was originally made. Instead the author entered into an intensive study of the inorganic salt and nitrogen metabolism of rats which had been subjected to strict limitation of mineral salts. This research is a part of the larger general investigation of the influence of nutrition with rations poor in inorganic salts and is quite as important as the subject for which the grant was made.

We have made satisfactory progress with the problem. First of all, a non-metal cage was required and when a satisfactory design was devised, a portion of the grant was used to purchase parts for the construction of these cages. Another part of the fund was used for preparation of feeding materials very low in inorganic salts—a task requiring strict supervision and careful chemical control. The preparation of the experimental animals used in this study necessitates meticulous care by a high-grade technical assistant, provided in this instance by the research fund. The most difficult part of the pioneer work is over and the project is now well on its way to completion.

Professor William Randolph Taylor, University of Pennsylvania; Preparation of Plates with More Accurate Details Than Ordinary Half-Tones.

An article in the *American Journal of Botany*, for May, 1931, on "Chromosome Structure during Microsporo-genesis and the Past Meiatic Mitosis" is accompanied by four full-page, relatively elaborate plates with a total of forty-three figures. All illustrate a study of meiosis in the microsporocytes of the African genus Gasteria. This investigation has resulted in a more comprehensive description

of meiotic phenomena along the line of a chromonematal history resulting in the formation of a typical chromosome tetrad than has yet been accomplished. It has, for this plant at least, shown that certain apparently conclusive objections to this interpretation were unfounded. Consequently a coherent and complete history of meiosis is now available, with the display of much more of the mechanism involved than has been known in the past.

REPORTS FROM CHAPTERS AND CLUBS

The National Secretary has received reports of activities for 1930–31, from 36 of the 58 chapters, and from 8 of the 28 clubs. If time permits at the proposed convention supper, the secretary desires to summarize the chapters and club activities in connection with the discussion of the topic, "How Can Chapters Best Further the Purpose of the Society?" Will chapter and club secretaries who have not yet submitted a report, communicate with the National Secretary before December 15.

LIST OF MISSING PERSONS

Can You Help Us Locate These Members?

Name	*Chapter*	*Last Known Address*
Dickinson, Leonard Perley	Stanford 1926	Burlington, Vermont
Dickenson, William Jay	Union 1903	76 Holmes Rd., Pittsfield, Mass.
Dickey, Ernest	McGill 1922	
Dickson, Charles W.	Columbia 1903	Kelowna, B. C., Canada
Dickson, John Byron	Ohio 1922	Hicksville, Ohio
Dickson, Lester Liggett	Ohio 1924	Brown Hall, Ohio State Univ. Campus, Columbus, Ohio
Dickey, James Allen	Cornell 1931	University of Arkansas
Diehl, Adam Paul	Kansas 1919	Oswatomie, Kansas or 745 S. Detroit, Los Angeles, Calif.
Dietz, Emily Marie	Ohio 1914	124 Bellevue Avenue or High School, Chillicothe, Ohio
Diller, Isaac Slaymaker	Penn. 1912	4725 Bayard St., Pittsburgh, Pa.
Dillingham, Albert Edwin	Brown 1918	14 Oakland Ave., Waterbury, Conn.
Dines, Charles Ross	Northwestern 1907	1220 Central Street, Evanston, Ill.
d'Irsay, Stephen (Dr.)	Calif. 1925	2970 Ellis Ave., Chicago, Ill., or Univ. of California Hospital, San Francisco, Calif.
Dixon, Max Muller	Columbia 1917	
Doak, Kenneth Davis	Purdue 1930	218 Marstellar St., W. Lafayette, Ind.
Dobbin, Emily Elizabeth	Chicago 1903	1521 Grand Ave., St. Paul, Minn.
Dobbins, Raymond Anson	Ohio 1922	B. & Z. Bldg., Ohio State Univ. Campus, Columbus, Ohio
Dodd, Clark Insley	Kansas 1913	Altoona, Kansas or 54 S. 18th St., Kansas City, Mo.
Dodge, Bert E.	Kansas 1912	
Dodge, Charles Thompson	Ill. 1926	1109 W. Illinois St., Urbana, Ill.
Doebler, Errol Weber (Prof.)	Cornell 1915 Swarthmore 1923	Dept. of Civil Engineering, Swarthmore College, Swarthmore, Pa.
Doggett, Ruth Allen	Chicago 1925 J. H. U. 1926	Goucher College, Baltimore, Md., or 5476 Everett Ave., Chicago, Ill.
Doll, Theodore	Northwestern 1918	106 Haven House, Northwestern Univ. Campus, Evanston, Ill.
Dome, Robert Byron	Purdue 1926	Evansville, Ind.
Domzalski, Casimir Anthony	Mich. 1919	5249 McDougall Ave., Ann Arbor, Mich.

Donaldson, Millard Eugene	Penn. 1918	2027 Woodberry Ave., Baltimore, Md.
Doner, Ralph Douglas	Ill. 1925 Ill. 1926	419 N. H. Bldg., Univ. of Illinois, Urbana, Ill.
Doolittle, Mrs. A. K. (Dorotha B. Bailey)	Ill. 1920	18 Momm Center, Irvington, N. J.
Dorr, Eleanor McElroy	Cornell 1922	
Doryland, Charles J. T.	Yale 1920	
Doss, Gerald	Calif. 1913	1631½ Allston Way, Berkeley, Calif.
Doubrava, Harry Wilfred	Nebraska 1897	49 Euclid Ave., Hackensack, N. J.
Dougan, Stanley (Dr.)	Stanford 1922	971 Hampshire St., San Francisco, Calif.
Dougherty, J. E.	Wis. 1925	
Douglass, Irwin B.	Kansas 1930	Sterling, Kansas
Dow, Donald B.	Nebraska 1924	Bureau of Mines, Bartlettsville, Neb.
Dowell, Norah Eloise	Brown 1916	U. S. Geographical Survey 1822 H St., N. W., Washington, D. C.
Downie, Dorothy Gladstone	Chicago 1926	University of Chicago, Chicago, Ill., or 852 East 57th St., Hyde Park Station, Chicago, Ill.
Downing, Frank Eugene	Minnesota 1904	The Cherokee Coal & Iron Company, 7 Echols Bldg., Gadsden, Ala.
Downs, Ardrey Whidden (Dr.)	Penn. 1904	Edmonton, Alberta, Canada
Doyle, Dorothy G.	Calif. 1923	Hygiene Pathology Lab., Univ. of California Campus, Berkeley, Calif.
Doyle, L. P. (P. L. ?)	Purdue 1921	217 Harrison St., West Lafayette, Ind.
Dozier, Herbert L.	Ohio 1920	Columbia, S. C.
Dreese, Erwin Ernest (Prof.)	Mich. 1920	Univ. of Michigan, Ann Arbor, Mich.
Drew, David Abbot	Indiana 1910	
Dreyer, Alice Domsler	Calif. 1931	2510 Bancroft Way, Berkeley, Calif.
Droba, Daniel Dobroslav	Chicago 1929	5642 Ellis Ave., Chicago, Ill.
Drummond, Neva	Wisconsin 1925	
Dub, George D.	Columbia 1912	
Du Berger, Rene Louis Alfred	McGill 1923	
Duering, Carl Floyd	Calif. 1931	International House, Berkeley, Calif.
Dufour, Frank Oliver	Ill. 1908	147 Milk St., Boston, Mass.
Duncan, Daniel McLean	Calif. 1918	5820 Howell St., Oakland, Calif.
Duncan, Dewey C.	Calif. 1926	2224 Dana St., Berkeley, Calif.
Duncan, Lindsey (Prof.)	Union 1901	
Dunn, Elizabeth H.	Chicago 1903	6413 Sangamon St., Chicago, Ill.

CHAPTER OFFICERS

LIST FURNISHED BY THE SECRETARIES OF THE CHAPTERS

CHAPTER	PRESIDENT	VICE-PRES.	SECRETARY	TREASURER
Cornell	W. A. Hagan	J. R. Johnson	H. B. Adelmann	A. J. Heinicke
Rensselaer	F. W. Schwartz	E. B. Allen	F. M. Sebast...	H. E. Stevens
Union	J. W. Mavor	D. S. Morse	C. B. Hurd	C. B. Hurd
Kansas	P. B. Lawson	L. D. Havenhill	J.C.Stranathan	H. E. Jordan
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